Transmission of *Enterobacteriaceae* in Neonatal Intensive Care Unit (NICU) practising family oriented care

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Background & Aim

Early skin-to-skin contact and feeding with mothers` own breast milk (MOBM) is beneficial to infants' development but may be a source of colonizing bacteria. Furthermore, studies have shown that extended-spectrum β-lactamase (ESBL) producing bacteria may originate from mothers.

We aimed to describe colonization of premature neonates with *Enterobacteriaceae* and determine the relationship between strains isolated from neonatal stool to those from MOBM.

Materials and Methods

The study was conducted from March to December 2018

Inclusion criteria:

- neonates with gestation age (GA) of <34w;
- receiving MOBM in first hours of life;
- exposed to parental skin-to-skin contact within first 4 days of life.

Neonatal stool and MOBM were collected at birth, at the age of one and four weeks;
cultured onto MacConkey agar plates and indentified by useing MALDI-TOF.
The presence of ESBL was detected by ChromaticTM ESBL media and cefpodoxime disks (10µg). PFGE was used to define genetic relatedness of strains

- NICU strains were defined if similar PFGE pattern was seen in >1 mother-neonatal pair.

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Results

We recruited **32 mother-neonatal pairs** with neonatal mean GA 29.6 (±2.9) weeks; birth weight 1497 (±477) g, and NICU stay of 17.1 (±4.2) days. Median (IQR) first enteral feeding with MOBM is 16 (3-93) hours, and total enteral feeding 7 (4-18) days. Skin to skin contact (mother or father): median (min-max) 12 (1-20) hours.

Altogether, **83 enterobacterial isolates** were detected.

Of all isolated *Enterobacteriaceae* 24 (30%) were NICU strains (Table), and almost half of neonates were colonized for the 4th week of life (Figure).

Figure. Number of neonates and MOBM colonized with enterobacterial strains/NICU strains in birth, 1st and 4th week of life

	Stool Total strains / NICU strains		MOBM Total / NICU strains	
	1 week	4 week	1 week	4 week
E. cloacae	5 / 1	8 / 4	0	4 / 0
E. coli	7 / 2	14 / 7	0	3 / 3
Klebsiella spp	4 / 1	15 / 3	1 / 1	1 / 0
Other enterobacter	9 / 1	10 / 1	1 / 0	1 / 0
Total	25 / 5 (20%)	47 / 15 (32%)	2 / 1 (50%)	9 / 3 (33,3%)

Table. Number of different enterobacterial strains/NICU strains in neonatal stool and MOBM in 1st and 4th week of life

5 of 8 strains with similar PFGE pattern first appeared in neonatal gut and then in MOBM.

Only two isolates (2.4%; *E. clocae* from faeces and *K. oxytoca* from MOBM) were ESBL-positive.

Conclusion

Majority of neonates who were colonized with *Enterobacteriaceae* acquired it from NICU environment, despite early exposure to MOBM and skin-to-skin contact.
Our study showed, that MOBM is unlikely source of *Enterobacteriaceae* including ESBL.